Math 1100 Lesson # 8 **Name:**______________________________

Directions: Work all problems in the assignment. If you need more room use the back of the page to complete the problem.

Section 4.2

Problem 40. **Effective Rate** Find the effective rate of interest corresponding to a nominal rate of 7.5% per year compounded (a) annually, (b) semiannually, (c) quarterly, and (d) monthly.

Problem 42. **Present Value:** How much should be deposited in an account paying 7.8% interest compounded monthly in order to have a balance of $21,154.03 four years from now?

Problem 46. **Demand:** The demand function for a product is modeled by

$$p = 10,000\left(1 - \frac{3}{3 + xe^{-0.001x}}\right)$$

Find the price of the product if the quantity demanded is (a) $x = 1000$ units and (b) $x = 1500$ units. What is the limit of the price as x increases without bound.

Section 4.3

Problem 12. Find the derivative of the function.

$$y = 4x^3e^{-x}$$

Problem 16. Find the derivative of the following function.

$$y = x^2e^x - 2xe^x + 2e^x$$

Problem 22. Determine an equation of the tangent line to the function at the given point.

$y = (e^{4x} - 2)^2 \qquad (0, 1)$

Problem 38. **Depreciation** The value V (in dollars) of an item is a function of time t (in years).

(a) Sketch the function over the interval $[0, 10]$. Use a graphing utility to verify your graph.

(b) Find the rate of change of V at $t = 1$.

(c) Find the rate of change of V at $t = 5$.

(d) Use the values $(0, V(0))$ and $(10, V(10))$ to find the linear depreciation model for the item.

(e) Compare the exponential function and the model from part (d). What are the advantages of each?

$V = 500,000e^{-0.2231t}$

Section 4.6

Problem 32. **Effective Yield** The effective yield is the annual rate i that will produce the same interest per year as the nominal rate. r.

(a) For a rate r that is compounded continuously show that the effective yield is $i = e^r - 1$.

(b) Use the formula from part (a) to find the effective yield for a nominal rate of 6% compounded continuously.

Problem 40. **Sales:** The cumulative sales S (in thousands of units) of a new product after it has been on the market for t years are modeled by

$$S = 30(1 - 3^{kt})$$

During the first year, 5000 units are sold.

(a) Solve for k in the model.

(b) What is the saturation point for this product? The deinition of the saturation point for a product is given in Problem 39 in this section (4.6). Note that this is the problem in the text just before this problem.

(c) How many units will be sold after 5 years?

(d) Use a graphing utility to graph the sales function.

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